

PPG PITT-CHAR® XP

Passive protection against hydrocarbon hazards

Our pioneering flexible intumescent technology saves lives and protects assets in the world's toughest fire and cryogenic environments.



Safety when it matters

Flexible, single-product solution

Specially formulated for the oil and gas industry, PPG PITT-CHAR XP is a single coating solution designed to save lives and protect assets in the event of a hydrocarbon hazard such as an explosion, impact, fire or cryogenic spill.

Introduced in 1983, our product has more real-time history than any other epoxy intumescent coating available today with hundreds of projects successfully completed globally.

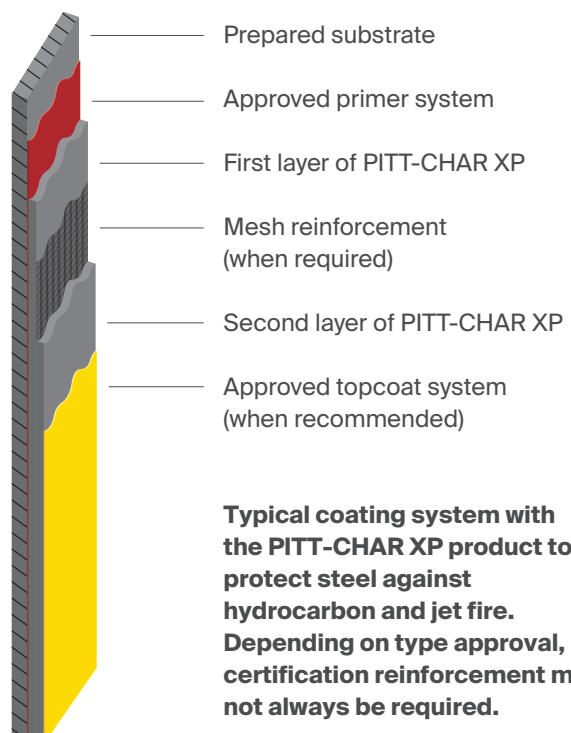
In addition to its unrivaled fire protection, the unique flexibility of PPG PITT-CHAR XP provides enhanced resistance to cracking on flexing and vibrating structures, and exhibits excellent performance particularly under cryogenic and explosion overpressure conditions. This flexibility also means that our product is particularly suited to modular construction projects.

PPG PITT-CHAR XP – the single-product solution for fire and cryogenic spill protection

- Saves lives and protects assets - unrivalled protection against hydrocarbon hazards
- Unique flexibility – enhanced crack resistance during construction and in service
- Highly efficient single layer – no expensive and brittle syntactic foam insulation required
- Superior low-temperature adhesion
- Mechanically tough – reduces damage and repair
- Increases fabrication speed and efficiency
- Helps improve application quality
- More cost-effective through service life
- Extensively tested and approved by customers and third party institutes

Versatile application – durable protection

The illustration below shows the various layers used in the application of the PPG PITT-CHAR XP.





Pioneering technology – unique flexibility

Flexibility is what makes our PPG PITT-CHAR XP coating so unique. Based on our patented, flexible, cross-linked epoxy resin, our product has been proven to outperform other conventional, rigid epoxy intumescent systems in severe situations.

Our product also has one of the highest impact resistances in the hydrocarbon PFP industry. Unlike rigid epoxy intumescent coatings, PPG PITT-CHAR XP is tough and ductile with an elongation at break of approximately 20%.

These properties mean that PPG PITT-CHAR XP is better able to withstand:

- Severe temperature changes
- Offsite application
- Slings and load out
- Transport by sea, rail or road
- Vibration
- Impact
- Explosions
- Steel deformations; elastic and plastic

Advantages of the the PITT-CHAR XP coating over rigid hydrocarbon PFP

Break Strain (% elongation) versus temperature

Even at temperatures as low as -40°C (-40°F) our product is still five times more flexible than rigid epoxy systems.

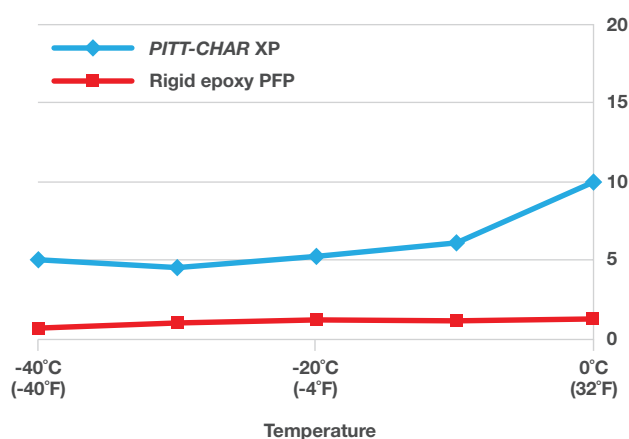


Figure 1: Break Strain (% elongation) versus temperature

Passive fire protection

When exposed to fire, PPG PITT-CHAR XP expands to form an insulating char that prevents steel from heating up rapidly. This delays the loss of load-bearing capacity and integrity, buying crucial time for personnel to escape.

Our product has been extensively tested against the most up-to-date international fire test standards and has also been proven in service under large-scale, major accident hazards such as jet fires, explosions and impact. It holds type approval certification with all the leading certifying bodies such as ABS, BV, DNV-GL, LR, UL.

We have designed PPG PITT-CHAR XP to withstand both the overpressure and the real life deflections that blast-impacted items will experience. Our product's flexibility allows designers to utilize both elastic and plastic deformation of the structures without compromising the fire protection capabilities.

Comparison of fire test curves

The graph below shows the difference in temperatures depending on the type of fire. PPG PITT-CHAR XP product meets the most severe jet fire temperatures.

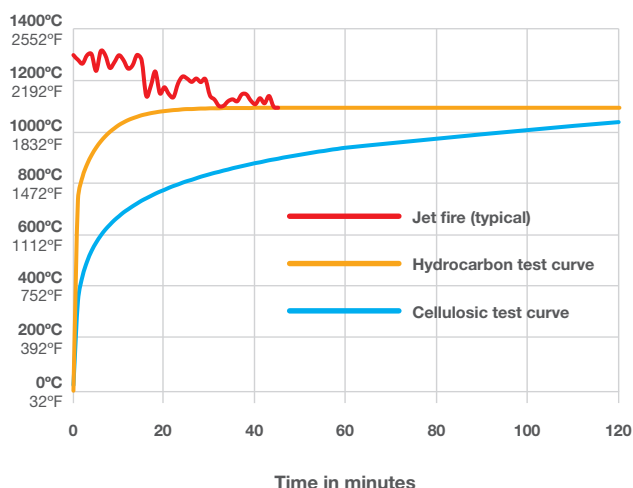


Figure 2: Difference of temperatures by fire type

Jet and torch fire testing

- Up to 180 minutes jet fire (ISO-22899-1)
- NFPA 58 torch fire and hose stream tested
- Excellent resistance to high heat flux and erosive fires
- Full-scale jet fire tested at the British Gas Spadeadam facility

Pool and diffuse hydrocarbon fire testing

- UL1709 environment and fire testing – XR612 design up to 5 hours – XR636 design up to 4 hours – Approved over carbon and galvanized steel
- ISO834 Hydrocarbon Fire – Structural beams and columns (120 minutes) – Fire separating divisions A-60, H-0, H-60, H-120

Explosion testing

- Able to withstand overpressures of >4 bar (>60 p.s.i.)
- Resistant to shockwave, drag forces,
- Capable of withstanding plastic and elastic deformations
- Resistant to impact damage from projectiles



Cryogenic spill protection

As the only patented flexible intumescent epoxy on the market, our PPG PITT-CHAR XP offers you an effective single coating solution for both fire and cryogenic spill protection.

Even under conditions of rapid cooling, our product's single layer maintains its internal cohesion, providing a continuous film that insulates at extremely low and high temperatures at the same time.



Test: PPG PITT-CHAR XP exposure to liquid nitrogen pooling on a boxed steel panel

In these tests, the spill of a cryogenic liquid to a steel deck has been simulated. A steel panel, with walls to allow the liquid nitrogen used for the spill to pool, has been coated with PPG PITT-CHAR XP. The average temperature measured on the backside of the panel after 120 minutes exposure was -18°C (-0.4°F).

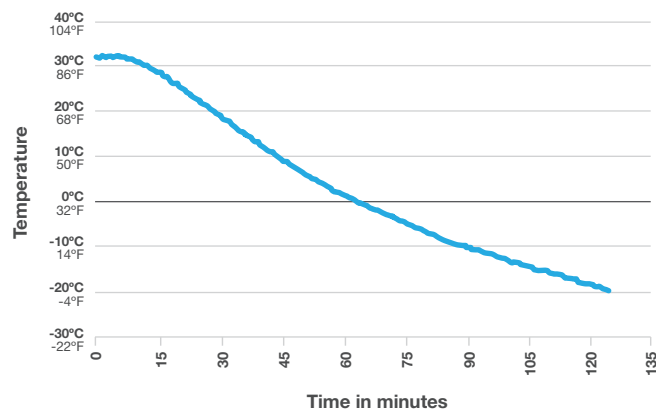


Figure 3: Liquid Nitrogen exposure of a boxed steel plate

Confidence in performance



PPG PITT-CHAR XP satisfies both cryogenic and hydrocarbon fire tests

Test	Average steel temperature
75 minutes liquid nitrogen immersion at 196°C (-320°F)	-29°C (-20°F)
60 minutes fire test	0°C (32°F)
120 minutes fire test	67°C (153°F)
180 minutes fire test	140°C (284°F)

Table-1: Cryogenic and hydrocarbon fire test

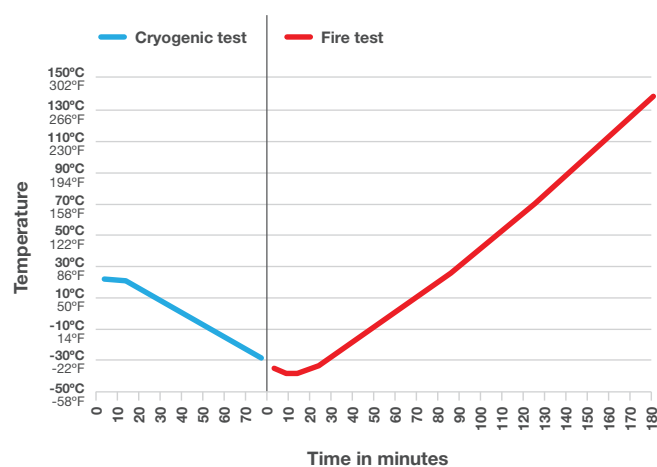


Figure 4: Cryogenic immersion followed by UL 1709 fire test (180 minutes)

Cryogenic spill exposure

- Tested with liquid nitrogen at -196°C (-320°F)
- Extensively tested (up to 60 minutes cryogenic exposure)
- Tested for full immersion, pooling and spray

Combined CSP and fire testing

- Full immersion CSP immediately followed by UL1709 test
- 180 minutes jet fire testing following 30 minutes full liquid nitrogen immersion
- Extensive spill testing at different thickness and duration to provide an optimized solution
- Demonstrates the single-content system is effective

Crack resistant

- Patented flexible resin technology resists cracking under severe cryogenic conditions
- Avoids use of heavily loaded glass bead syntactic systems that are expensive and prone to brittle cracking
- PPG PITT-CHAR XP coating resists damage from minor leaks at system startup

PPG PITT-CHAR XP – full lifecycle benefits

Extensive track record

As a result of its unique flexibility, PPG PITT-CHAR XP has been one of the world's leading hydrocarbon passive fire protection products for over 30 years. It has an extensive record with proven outstanding performance in both offshore and onshore oil and gas projects.



Image: PPG PITT-CHAR XP coating intact with excellent adhesion and corrosion protection after 13 years in service offshore

Uniquely flexible

PPG PITT-CHAR XP often exceeds global standards. When blast-tested, it survives over pressures greater than 4 bar (when the standard only requires 1 bar) with no signs of cracking, delamination or disbondment. This means that, under explosion conditions, our extremely robust product will protect the steel – even when there is significant steel deflection – whereas rigid epoxy systems are prone to crack, exposing the steel substrate to the effects of any subsequent fire.



Image: The PPG PITT-CHAR XP coating intact after 4-bar overpressure blast test

PPG PITT-CHAR XP satisfies the widespread global requirement for a flexible and resilient hydrocarbon PFP that can withstand movement, flexing, stress after application, cold temperatures, cracking and high pressure blasts that cause significant substrate deflections.

Benefits for modular construction

The use of PPG PITT-CHAR XP intumescent coating increases fabrication speed and efficiency, resulting in faster turnaround of structural steel and enabling tight production schedules to be met. It is compatible for use over a wide range of steel substrates, including carbon steel and galvanized steel.

Both flexible and tough, PPG PITT-CHAR XP resists cracking and damage during slinging and handling, so that the fireproof coating remains in good condition when steel is transported and erected on site.

The hardwearing flexibility of PPG PITT-CHAR XP also helps to minimize possible damage caused by other trades such as pipe fitters and insulators working in the area.

Longer life = lower costs

PPG PITT-CHAR XP enables you to reduce the long-term costs of inspection and maintenance.

As an extremely robust coating with a long service life, it is able to withstand weathering and ageing with little or no maintenance required. This offers an extended inspection window and eliminates the need for constant patching.

PPG PITT-CHAR XP also future-proofs oil and gas facilities against further hazards such as jet fire and explosion, which are not currently mandated in API guidelines but are identified by the Chemical Safety Board (CSB) reference as real threats, and therefore anticipates changes to industry standards and legislation.

The coating is tested and approved for industrial environments by some of the world's leading laboratories.



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